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PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

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Applicant's or agent's file reference BCT000059/BLO	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/FR00/01904	International filing date (day/month/year) 04 July 2000 (04.07.00)	Priority date (day/month/year) 05 July 1999 (05.07.99)
International Patent Classification (IPC) or national classification and IPC G10L 19/02		
Applicant MATRA NORTEL COMMUNICATIONS		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 9 sheets, including this cover sheet.

☐ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of _____ sheets.

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3. This report contains indications relating to the following items:

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- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☒ Certain defects in the international application
- VIII ☒ Certain observations on the international application

Date of submission of the demand 10 January 2001 (10.01.01)	Date of completion of this report 26 September 2001 (26.09.2001)
Name and mailing address of the IPEA/EP	Authorized officer
Facsimile No.	Telephone No.

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I. Basis of the report

1. This report has been drawn on the basis of (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments.*):

- ☐ the international application as originally filed.
- ☒ the description, pages 1-30, as originally filed,
 pages _____, filed with the demand,
 pages _____, filed with the letter of _____,
 pages _____, filed with the letter of _____.
- ☒ the claims, Nos. 1-16, as originally filed,
 Nos. _____, as amended under Article 19,
 Nos. _____, filed with the demand,
 Nos. _____, filed with the letter of _____,
 Nos. _____, filed with the letter of _____.
- ☒ the drawings. sheets/fig 1/11-11/11, as originally filed,
 sheets/fig _____, filed with the demand,
 sheets/fig _____, filed with the letter of _____,
 sheets/fig _____, filed with the letter of _____.

2. The amendments have resulted in the cancellation of:

- ☐ the description, pages _____
- ☐ the claims, Nos. _____
- ☐ the drawings, sheets/fig _____

3. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

4. Additional observations, if necessary:

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V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-5, 7-15	YES
	Claims	6, 16	NO
Inventive step (IS)	Claims	2, 3, 13, 14	YES
	Claims	1, 4, 5, 7-12, 15	NO
Industrial applicability (IA)	Claims	1-16	YES
	Claims		NO

2. Citations and explanations

- Document US-A-5 878 388 is considered to be the prior art closest to Claim 1 and will be referred to as D1.

D1 discloses a method for analysing an audio signal (voice signal, Column 5, line 63) processed in successive frames of N samples that are weighted using a Hamming window (Column 6, lines 12-14), wherein a spectrum of the weighted audio signal is calculated by frequency transformation (Column 6, lines 59-65), and the spectrum is processed so as to provide synthesis parameters (Column 9, lines 40-47 and Column 7, lines 1-3), with said successive frames for which sets of parameters are provided overlapping by less than N/2 samples (Column 6, lines 8-11: length of the window = 256, overlap = 96).

The feature according to which complete and incomplete sets of parameters are provided alternately is novel over D1.

- The technical problem solved by introducing the above-mentioned novel feature is, of course, that of

limiting the coding rate.

Document D2 = AHMADI S ET AL: 'New techniques for sinusoidal coding of speech at 2400 bps' CONFERENCE RECORD OF THIRTIETH ASILOMAR CONFERENCE ON SIGNALS, SYSTEMS AND COMPUTERS (CAT. NO. 96CB36004), CONFERENCE RECORD OF THE THIRTIETH ASILOMAR CONFERENCE ON SIGNALS, SYSTEMS AND COMPUTERS, PACIFIC GROVE, CA, USA, 3-6 NOV. 1996, pages 770-774 vol.1, XP002138769 1997, Los Alamitos, CA, USA IEEE Comput. Soc. Press, USA, discloses a technique for voice coding which provides spectral parameters on frames of a fixed length (page 770, "Introduction", left-hand column). To limit the bandwidth of the coder, said document suggests limiting the transmission of coding parameters to every other frame, with the missing parameters being re-estimated by interpolation (page 773, Chapter 5, lines 1-16). Therefore, in D2, the set of parameters for every other frame is incomplete since it is empty.

Therefore, the subject matter of Claim 1 is derived from the introduction of the teaching of D2 concerning the rate reduction in the method known from D1. Such a juxtaposition of is considered to be obvious and, therefore, fails to meet the requirements of inventive step.

The argument that a window overlap of less than $N/2$ is detrimental to the transmission of every other frame cannot be used to justify an inventive step. Indeed, it is perfectly obvious that the further apart the windows, the greater the change in spectral parameters from window to window and,

therefore, the greater the loss of coding quality, especially when every other frame is interpolated, as in D2. Therefore, a person skilled in the art would select the spacing of the windows in relation to interpolation in full knowledge of the facts, in such a way as to achieve a compromise between rate reduction and coding quality. In particular, there is nothing to stop the type of coding claimed in Claim 1 from being used since this is also the most obvious choice, in view of the combined teaching of D1 and D2.

3. The additional features of Claim 4 are also known from D1 (see the above-cited passages). Therefore, Claim 4 fails to meet the requirements of inventive step, as is the case for Claim 1.
4. The additional features of Claims 2 and 3 are novel and considered to be non-obvious in view of the prior art. Therefore, said features involve an inventive step.
5. The additional feature of Claim 5 is novel over D1, but is standard practice in the prior art and has no effect on the coding characteristics, *per se*, associated with the frames and the windows. Therefore, this juxtaposition is not considered to be inventive.
6. All signal processors would be capable of carrying out the method of Claims 1 to 5. Given the lack of clarity resulting from the disclosure of Claim 6 (see Box VIII), this claim is not novel.
7. Document D3: "A weighted overlap-add method for

short-time Fourier analysis/synthesis", R.E. Crochiere, IEEE Trans. on ASSP, Vol. ASSP 28, February 1980, pages 99-102, which is cited for the first time, is considered to be the prior art closest to Claim 7.

D3 discloses an analysis/synthesis method which uses short-time Fourier transformation (STFT) and, as such, contains all of the features of the preamble to Claim 7.

According to the diagram of Figure 2, D3 applies a synthesis window $f(n)$ to the re-synthesized short-time sequences and adds the signal portions obtained using the overlap-add method. In this sense, D3 is as general as possible since it does not specify any conditions relating to the analysis and synthesis windows. However, it is well known that an appropriate selection of analysis and synthesis windows results, for example, in a synthesized signal identical to the original (see D3, page 100, right-hand column, paragraph between the equations (8) and (9)).

With the assumption that the characterising part of Claim 7 is clarified (see Box VIII), said part amounts to ensuring that the signal portions weighted using a multiplicative analysis window regain their original amplitude during the synthesis process through a division by the analysis window f_A , and that the short-time signals thereby obtained are weighted, over the overlapping interval, using the synthesis window f_S such that when an overlapping addition step is applied to the signals, the sum of the weighting factors is equal to a

constant, which is identical to the portions not representing an overlap. Such measures can be derived in an obvious manner from a document such as D3 and merely formalise the conditions relating to the shape of the windows (See the drawing which is perfectly known to a person skilled in the art featured in US-A-5 911 130, Figure 7 and Column 8, lines 24-38, for example).

It is observed that the role of the synthesis window is often disregarded in the prior art. Thus, in the conventional STFT analysis/synthesis diagram, wherein the triangular analysis or Hanning windows overlap by 50% so that the sum is constant and equal to one, an identical overlapping addition step is applied to the re-synthesized signals, without the use of a synthesis window. However, it is obvious that the latter operation leads to the same result as a division using the analysis window (to regain the amplitude 1 on the frame), followed by the use of a synthesis window which is equal to the starting analysis window (to obtain sufficient weighing over the overlapping intervals), as mentioned in Claim 7. Therefore, apart from amounting merely to a strict formalisation to support a perfectly standard practice, this is by no means novel.

8. The additional features of Claims 8 and 9 are merely examples of windows known in the prior art, which are not inventive *per se*.

9. D1 is considered to be the prior art most relevant to Claim 10.

In accordance with the assessment made in point 2 above, the features of Claim 10 (up to page 33, line

1) are made obvious by a combination of D1 and D2.

The additional features on page 33, lines 2-8 merely state the conditions applied to the analysis and synthesis windows of Claim 7 using different terms (M/p offset rather than L). For the same reasons given in point 7 above, the examiner considers these additional features to be obvious to a person skilled in the art. Therefore, even when combined with the rest of Claim 10, no inventive step is acknowledged for said features.

10. The negative opinion given for Claims 8 and 9 also applies to Claims 11 and 12.
11. The positive opinion for Claims 2 and 3 also applies to Claims 13 and 14.
12. Although D1 and D2 only refer to spectral coefficients, the extension to cepstral coefficients as claimed in Claim 15, which are known *per se*, does not appear to have any effect on coding principles. Therefore, the subject matter of Claim 15 does not meet the requirement of inventive step, for the same reasons as Claim 10.
13. Claim 16 lacks novelty for the same reasons as Claim 6 (see also Box VIII and points 1 and 2).
14. All of the claims are industrially applicable.

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VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

1. Contrary to the requirement of PCT Rule 5.1(a)(ii), the relevant prior art disclosed in documents D1, D2 and D3 has not been indicated in the description, nor have these documents been cited.

VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

1. Claim 6 mentions a device which includes "means for carrying out" a method. Such wording lacks clarity since it must be interpreted as including means which are simply suitable for carrying out such a method. In other words, the claimed means are not limited to those actually programmed to carry out the method.

To remove the above objection, the expression "to carry out" should be replaced with "programmed to carry out", for example.

2. The same objection applies to Claim 16.
3. In Claim 7, the clause "each evaluated frame is modified by being subjected to processing corresponding to a division..." lacks clarity since it is not possible to determine whether the claimed processing actually consists in carrying out a division followed by a multiplication, as mentioned in Claim 7, or whether it is another type of processing leading to the same result.

One example illustrates this ambiguity: The STFT synthesis method as described in D3 can be applied to rectangular analysis and synthesis windows with an amplitude equal to 1, of a length N and offset by N. The analysis/synthesis comprises the step of putting portions of signals that are transformed, then retransformed back again, end to end. In this case, there is no need to process the evaluated

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frames, but this lack of processing corresponds to a division by the analysis window and a multiplication by the synthesis window, since these operations result in an identical output.